Annual Water Quality Report
1998

U.S. Army Corps of Engineers
Sacramento District

I. Introduction

A. **Requirements** - This report follows the requirements of Engineering Regulation 1110-2-8154, entitled “Water Quality and Environmental Management for Corps Civil Works Projects”. This regulation requires a summary of the water quality management program for the past fiscal year, and requires that the following items be addressed:

- describe the goals and objectives of the overall water quality management program
- progress made toward meeting these goals and objectives
- activities that are planned for the out years
- changes in technical capabilities in the district office
- relationship between water quality and water control management activities
- pertinent division regulations
- laboratory facilities
- data management system
- training needs
- a discussion of research and development needs
- special studies completed or required
- water quality coordination with other agencies
- scheduling for detailed project evaluations
- problems encountered with contracted work
- special assistance from other Corps elements or research facilities
- a project-by-project summary of water quality conditions
- problems encountered and how addressed at each project
- opportunities identified and how addressed
- innovative techniques utilized to improve water quality

B. **Goals and Objectives** - The goals and objectives of the water quality management program are to ensure that projects in the planning, design, construction, and operation phases do not degrade water quality, so that the beneficial uses of the water can be achieved. This is achieved

through monitoring programs, the application of Best Management Practices, the utilization of mathematical models and other analytical techniques, and the installation of mitigation devices where needed. For the existing 12 lakes in the annual lake monitoring program, the goals have been to establish baseline water quality conditions, to ensure that the lakes are protected against the entrance of undesirable nutrient and toxic loads, and to ensure that the water quality remains satisfactory to support the beneficial uses assigned to the lake and the downstream water by the State Water Resources Control Board.

C. **Progress Made Toward Meeting The Goals and Objectives** - Water Quality monitoring programs, both for background conditions and compliance monitoring, are being utilized. The compliance monitoring data is sent to the applicable regulatory agencies for proof of compliance.

D. **Activities Planned For The Out-years -** All of the programs are expected to continue. Current planning for the existing annual lake water quality monitoring program is to start tailoring the program so that lakes which may start to experience problems have more monitoring done on them, while lakes with no apparent problems have a reduced monitoring program. The data collected from the Sacramento Deep Water Ship Channel salinity monitoring program needs to be summarized and archived so that it is available for comparison to post-deepening data. The jet aerators in the Stockton Deep Water Ship Channel are expected to continue to be utilized during the Fall salmon run.

E. **Changes In Technical Capabilities In The District Office** - Technical capabilities continue to grow. There is more knowledge now on signal processing techniques for data analyses, on chemistry QA/QC activities for sampling, on acid mine drainage problems, and on wetland uses for water quality improvements. District knowledge is growing on groundwater treatment.

F. **Relationship Between Water Quality And Water Control Management Activities** - The water quality activity is located within Environmental Engineering Branch, while the Water Control activity is located within Civil Design Branch. Personnel within the water quality activity are also involved in hazardous and toxic waste cleanup activities for DOD, EPA, and

other federal agencies, in some water and wastewater treatment activities, in acid mine cleanup, and in Brownfield support. There is some contact between the two activities as regards the annual lake water quality monitoring program, in that the water control management activity writes a contract to the U.S. Bureau of Reclamation to do the field work needed in collecting the water quality samples. The water quality activity writes the contracts to the chemistry and biological laboratories, analyses the results, and writes this report.

G. **Pertinent Division Regulations** - There are no pertinent South Pacific Division Regulations at this time.

H. **Laboratory Facilities** - Private laboratories are utilized to perform the analyses. The chemistry laboratory selected has to be State-certified in the parameters being analyzed. For the biological analyses (phytoplankton), an algalogist at the University of California at Davis does the analyses.

I. **Data Management System** - The District does not have a data management system at this time. Data is simply stored in binders. The District is hopeful that it can start utilizing the EPA's national data storage and retrieval (STORET) system soon for this purpose, and is currently awaiting training for this.

J. **Training Needs** - The District personnel are obtaining the training needed. Training in the environmental effects of dredging , water quality mathematical modeling of rivers and lakes, chemistry procedures, and others are available and funded for.

K. **Research and Development Needs** - The District needs to develop its water quality Field Sampling Plan and its Quality Assurance Project Plan for the annual lake water quality monitoring program.

L. **Special Studies Completed or Required** - The District had Waterways Experiment Station run the Corp's CE-QUAL-W2 mathematical hydraulics and water quality model on the Napa

River, to address concerns of the Napa Community Coalition that the project would not degrade dissolved oxygen concentrations in the Napa River, would not cause increased salinity intrusion from San Francisco Bay, or cause undesirable phytoplankton blooms. The District also plans to add the gasolene oxygenate MTBE (methly tertiary butyl ethylene) to its annual lake monitoring program, as this recently has caused some local concern at one of the lakes. The concern is that jet skies may be putting this substance into the lakes in quantities that may affect the fish and the people who consume the fish.

M. **Water Quality Coordination With Other Agencies** - The District maintained contact with the following agencies on water quality-related projects:

1. CALFED - This is a joint federal-state interagency group dedicated to preserving the environmental health of the San Francisco Bay-Delta system. The Sacramento District participates in the group's planning studies.

2. Bay-Delta Modeling Forum - This is an interagency group dedicated to ensuring that peer reviews are conducted on all mathematical models utilized and scientific studies done in the San Francisco Bay-Delta system. The Sacramento District is a member of the Forum.

3. National Ambient Water Quality Assessment Program - The USGS has been tasked by Congress to select watersheds throughout the United States and perform rigorous analyses of water quality there, the purpose being to start a trend toward obtaining high quality data for 21st Century decisions. Three watersheds have been selected within the Sacrament District boundaries, these being the Sacramento River Basin, the San Joaquin - Tulare Basin, and the Carson River Basin. A liaison committee exists for each of these basin studies, and the Sacramento District sits on these committees.

4. Lake Tahoe Water Quality Restoration Program - The Sacramento District is preparing to become involved in this program, with the Lahonton Regional Water Quality Control Board as a sponsor. The District is participating along with such agencies such as the Tahoe Regional

Planning Agency, the U.S. Geological Survey, the U.S. Forest Service, and the Universities of California and Nevada.

5. Mexico Work - The Sacramento District is working through the U.S. and Mexican embassies to obtain work in Mexico, some of which would be directed toward the cleanup of eutrophic lakes with severely impaired beneficial uses. The District intends to work with other Corps Districts to select the best teams for the job at hand, and to also utilize the Corp's Waterways Experiment Station for some of this work.

6. San Francisco Bay-Delta Circulation Studies - The USGS is conducting a multi-agency study of circulation within and salinity intrusion into the bays and Delta. The District has loaned the USGS its six underwater S-4 computerized data loggers in support of this study. The resulting data will be of use to all agencies involved in restoring the environmental health to the fragile ecosystem, and to those agencies such as the Corps that have projects in the area..

N. **Scheduling For Detailed Project Evaluations** - Scheduling is currently underway for the water quality work that supports the Sacramento River bank protection work and the deep water ship channel dredging.

O. **Problems Encountered With Contracted Work** - No problems have been encountered.

P. **Special Assistance From Other Corps Elements Or Research Facilities** - Assistance has been obtained from Waterways Experiment Station on mathematical modeling and dredging activities.

Q. **Project-By-Project Summary of Water Quality Conditions** - This is attached in the Sections below.

R. **Problems Encountered And How Addressed At Each Project -** It is becoming more difficult to meet the dredging water quality criteria as the regulatory agencies add more

parameters and stricter numerical criteria to their Waste Discharge Requirements for dredging. A fate and transport model has been developed by the Port of Stockton which may eventually be used to predict the attenuation that can occur through the aquifer between the bottom of the dredged material disposal site and the nearest well or gaining stream. One desire of the District is to put its past sediment core data, modified elutriate test data, and bioassay results into easily-read electronic format, so that data on new potential dredging projects can be compared to the existing data as serve as a basis for consideration by the regulatory agency in determining water quality impacts. Having the historic data easily accessible may also reduce the number of samples which need to be collected in the future and thus reduce costs.

S. **Opportunities Identified And How Addressed** - An opportunity for marketing the services of the Corps exists in the potential Mexico work. Mexico would gain the benefits that could be provided by the Corp's Waterways Experiment Station and hand-picked District teams, and the Corps would gain additional skills on water quality techniques applicable to different environmental situations.

T. **Innovative Techniques Utilized to Improve Water Quality** - Two innovative techniques are currently being utilized by the District, as follows:

1. Jet Aeration System - Sixteen jet aeration nozzles mounted on two underwater manifolds are continuing to be utilized to input 300 pounds per day of dissolved oxygen into the San Joaquin River at the Port of Stockton during the Fall salmon run.

2. Signal Processing - Signal processing utilizing harmonic analysis with digital filtering is being used along with multi-dimensional data to determine how deepening the Sacramento Deep Water Ship Channel will affect the flow and salinity fields. The digital filtering essentially removes the tidal effects from the data and allows net flow and salinity effects to be seen over the vertical depth of the river. This knowledge for before- and after- deepening can be used to determine whether any mitigative effects might be needed for the channel deepening.

U. **Action Items -**

- The detection limits on several of the monitored constituents needs to be lowered so the data can be useful for its intended purpose. This applies to the nitrogen data collected, and possibly other data.
- A determination needs to be made on the need for field blind duplicates.
- MTBE needs to be added to the monitoring program.
- The Field Sampling Plan and the Quality Assurance Project Plan need to be developed.
- Fish tissue analyses should be done for several lakes, to check for mercury content.

II. Projects in the Planning, Design, and Construction Phases

A. **Lake Tahoe** - The Tahoe Basin straddles the California and Nevada state line, about 85 miles northeast of Sacramento, California and 15 miles west of Carson City, Nevada. The Basin encompasses over 500 square miles and is comprised of Lake Tahoe and its 63 tributary watersheds. The Tahoe Basin ecosystem has been degraded by past and current human activities such as logging, grazing, stream channelization, road construction, recreational use, and urban development. The exceptional water clarity of Lake Tahoe is decreasing at a rate of about 1 foot per year due to accelerated inputs of nutrient and sediments. Other water resources and related problems in the Basin include lakeshore erosion, flooding along developed stream channels and lakeshore areas, aging wastewater infrastructure (threatening stream and lake water quality), and lack of public recreational access to the Lake Tahoe shoreline.

In June 1997, three multi-agency workshops were held in the Tahoe Basin focusing attention on water resources, transportation, forest health, and recreation and economic development problems and opportunities within the Basin. The Corps and Environmental Protection Agency (EPA) co-hosted one workshop which focused on water quality and other water resource issues. The three workshops culminated in a highly successful visit by the President and Vice-President in July 1997. A key output of the Presidential visit was Executive Order 13057 which directed the EPA, and the Departments of Agriculture, Interior, Transportation, and Army to establish a Lake Tahoe Federal Interagency Partnership. The purpose of the Partnership is to ensure that Federal actions are coordinated and protect the extraordinary natural, recreational, and ecological resources in the Lake Tahoe Basin and the economies that depend on them.

The Sacramento District is currently involved (1998) in the following efforts within the Basin:

1. Upper Truckee River Watershed Feasibility Study - An expedited reconnaissance study was completed in July 1997 which focused on the Upper Truckee River watershed, the largest sub-watershed in the Tahoe Basin. Environmental problems and potential improvement plans,

primarily identified by local interests, were considered in the study. The Tahoe Regional Planning Agency (TRPA) was the initial non-Federal sponsor for the study, but was unable to provide the non-Federal share for feasibility-level studies. After continued coordination with other local authorities, the California Regional Water Quality Control Board (Board) has indicated a willingness to be the primary non-Federal sponsor. The District is working with the Board to develop a Project Study Plan for the feasibility phase.

2. Supplemental Tahoe Basin Reconnaissance Study - The 1998 Energy and Water Development Act (EWDA) included $750,000 to continue general investigations within the Tahoe Basin. The Sacramento District is using $100,000 of this appropriation to conduct a reconnaissance study to investigate environmental restoration opportunities in the remainder of the Basin (exclusive of the Upper Truckee River watershed). This study was initiated in January 1998 and the 905(b) analysis was completed in September 1998. Coordination in the basin indicated that additional work in the California watersheds was not currently feasible due to limited non-Federal funds. The primary focus of this study has been with the Nevada Department of Transportation, Douglas and Washoe Counties in the Nevada portion of the basin, and with the numerous Public Utility Districts around the lake.

3. Upper Truckee River Aquatic Ecosystem Restoration Project - The 1998 EWDA also included direction and funding to conduct an ecosystem restoration project under Section 206 of WRDA 96 in the Upper Truckee River Watershed. We are working closely with City of South Lake Tahoe to develop a scope and schedule for the project. Preparation of a Preliminary Restoration Plan (PRP) describing the proposed restoration project was completed in August 1998. The next steps, an Ecosystem Restoration Report (ERR) and Plans and Specifications, are scheduled to be completed by June 2000 to allow construction to begin during the summer of 2000.

Challenges to effective Corps participation in resolving the major resource problems in the Tahoe Basin include:

1. Resolution of Highly Complex Regional Issues - Effectively resolving the environmental problems in the Tahoe Basin involve addressing numerous highly complex physical, economic, social, and institutional issues. The physical problems and potential solutions related to deteriorating stream and lake water quality and fish and wildlife habitat are highly interrelated with regional development and other area socioeconomic and political issues. Successfully addressing the problems will require close coordination with numerous and diverse Federal, State, regional, and local agencies.

2. Application of the Corps Study Process - The traditional Corps Civil Works project process is difficult to implement in the Tahoe Basin. The resources problems are scattered among the numerous sub-watersheds and often involve different non-Federal local interests. In our general investigation process, a logical next step would be a broad basin-wide investigation that could develop into a Federal project sometime in the future. This model is likely not implementable in the Tahoe area because of the numerous sub-watersheds and diverse non-Federal interests. We are working with local agencies in the Upper Truckee River watershed to develop a process where potential site-specific restoration projects can be identified and implemented concurrent with conduction a longer-term comprehensive watershed feasibility study

B. **Napa River Flood Control Project** - As a result of the Napa River Community Coalition Group the District changed its design to include a set-back levee downstream of the city of Napa. This involves the relocation of 6,000 feet of railroad track. The existing track and surrounding area was inspected to determine whether there were any hazardous and toxic waste sites that might impair water quality. Also, the Waterways Experimental Station finished their water quality modeling work, using the Corp's model CE-QUAL-W2.

C. **Bank Protection Projects Along the Sacramento and Feather Rivers** - Bank protection work is being done at eight sites along the Sacramento River. Water Quality studies are being done to determine if the construction of toe trenches at the bottom of the river banks or the placement of imported borrow material into the water will cause impaired water quality. If so, then mitigation methods will be decided on.

D. **Stockton Deep Water Ship Channel** - The jet aeration system, installed as a mitigative device for the permanent deepening of the Ship Channel, remains in operation to mitigate for dissolved oxygen in the San Joaquin River for the Fall salmon run. Sediment cores and modified elutriate tests have been run in preparation for the next dredging project.

E. **Brownfield Projects** - Work continues by the District's marketing personnel to relate Corps authorized studies, many of which can improve water quality conditions, to the nationwide Brownfield effort to restore slightly contaminated lands in the inner-cities so that industry and jobs will move there. The Salt Lake City Gateway project is such an example. The District has tied its aquatic restoration project into the Brownfield work there, with the intent to improve water quality in the city creeks, in the stormwater management ponds, and in the Jordan River. The Stockton Brownfield project is another example. Several events are going on in the same area there that can benefit from a coordinated action. The District is planning an aquatic restoration project near Mormon Slough to attract salmon into that area. The District is assisting the EPA in cleaning up an underwater Superfund site in Old Mormon slough that effects water quality. The City of Stockton has a Brownfield project along the river shores adjacent to both the salmon restoration site and the Superfund site. Some coordination has started to ensure that the net result of the actions tends to improve the water quality in the river there.

III. Annual Lake Water Quality Monitoring Program

A. **Parameters Being Monitored** - The District samples the 12 lakes during the Spring and during the Summer. The Spring monitoring reflects the lake condition after it has received the bulk of the incoming nutrients, organic loads, and other contaminants that may have washed off of the watershed, and before thermal stratification sets in. Some Spring blooms of phytoplankton may already have occurred. The Summer monitoring reflects the lake condition during strong thermal stratification, after most of the organic decay has occurred toward the lake's bottom, and most of the Spring and Summer phytoplankton blooms have occurred. The parameters monitored and the locations are shown in the attached figure.

B. **QA/QC Techniques -** The District is in the process of incorporating more QA/QC techniques into the annual lake monitoring program, so that the methodology is comparable to the USGS's NAWQS program. This will then allow a multitude of agencies to share their data in the future with a feeling of confidence in support of better 21st Century decisions affecting water quality. QA/QC techniques are built around a Field Sampling Plan and a Quality Assurance Project Plan.

1. Field Sampling Plan - The U.S. Bureau of Reclamation does the field sampling for the District. In their work they follow several protocols on field sampling, as follows:

- USGS Field Guide for Collecting Stream Quality Samples
- USGS ring binder entitled "Guide for Collection, Treatment, and Analysis of Water Samples, Western Region Field Manual, Sept. 1990.
- California Dept. of Water Resources, State Water Project Water Quality Field Manual, 1991.
- Various EPA protocols

The District is currently starting work on developing their own field manual which will incorporate the above by references but also take into account special needs of the District's program, such as the phytoplankton sampling program and field calibration techniques.

2. Quality Assurance Project Plan - The District is currently starting work on developing this plan. The guidance put out by the Corps entitled "Standard Guidance for the Preparation of Quality Assurance Project Plans" by Russell H. Plumb, dated November 1997, will be utilized. This document was developed specifically by the Waterways Experiment for Corp's water quality programs, which cover such activities as sampling lakes and the water quality resulting from dredging activities. The requirements of this plan will be placed into future field sampling and chemistry laboratory contracts. Hopefully the District's Field Sampling Plan and Quality Assurance Project Plan will be finished this year and be available for view on the District's web site.

C. **Lake Annual Water Quality Reports for 1999** - The following lakes have had reports written for them. These reports only contain the highlights or summaries of the complete report. The complete report for each lake is available from the District office and contains such additional information as QA/QC results with their Quality Control Summary Reports (QCSR's), complete laboratory analytical data results, and raw field data. They were not put into this summary report so as not to add too much bulk to this document.

1. Black Butte Lake
2. Eastman Lake
3. Englebright Lake
4. Hensley Lake
5. Isabella Lake
6. Kaweah Lake
7. Martis Creek Lake
8. Mendocino Lake
9. New Hogan Lake
10. Pine Flat Lake
11. Sonoma Lake
12. Success Lake

These reports are attached.